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245 SUMME

DATE	December 9, 1997
J.O. No.	04291.0410
	Task 28
LTR. NO.	T28-042
REF.	

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CONTRACT NO. N62472-92-D-1296
CTO NO. 0028 NCBC, DAVISVILLE, RI
RESPONSE TO COMMENTS ON DRAFT RISK ASSESSMENT FOR SITES 06, 08, 11

Enclosed please find four copies of the response to EPA and RIDEM comments on the Draft Human Health Risk Assessment and Ecological Technical Memoranda for Sites 06, 08, and 11. Please note that Site 13 comments will be responded to separately per discussions held in the November 13, 1997 BCT meeting. Regulatory comment or approval is requested by January 9, 1998.

Feel free to call me at (617) 589-1695 if you have any questions or comments.

Sincerely,

Linda B. Gardiner

Linda B. Gardiner
CTO Manager

cc: WDavis - NAVY (2 enc)
DRule - NAVY
RBoucher/GHicks - NAVY
CFlynn - EA
STyahla/PMO file -EA (enc)
JShultz - EA (enc)
DMayhew - EA (enc)
SErdal - EA (enc)
CWilliams - EPA (3 enc)
RGottlieb - RIDEM (2 enc)
HCohen - RIEDC (enc)
SLicardi - ToNK (enc)
TPrior - USFWS (enc)
BMorrison - RI RC&DC (enc)
ECurry - Dynamac (2 enc)
KBryson - 3
LGardiner - 3 (enc)
MBerube - 3 (enc)
LKaravetsos/C/JB 28W - 3 (enc)

RESPONSE TO EPA COMMENTS ON THE TECHNICAL MEMORANDA FOR GROUND WATER AT SITES 06, 08, AND 11

Please note that none of the EPA comments regarding the above referenced sites require responses. We are pleased that the discussions were "clear, complete, and logical" and that no problems were found in these sections.

RESPONSE TO RIDEM COMMENTS ON THE TECHNICAL MEMORANDA FOR GROUND WATER AT SITES 06, 08, AND 11

Comment 1. *Page 11-2, Site 11 Evaluation, Step 1. Please reference the July 1997 sampling results in this section and utilize them in subsequent sections as appropriate.*

Response. As discussed during the site visit attended by RIDEM, EPA, Navy, and Stone & Webster on June 26, 1997, the additional sampling at Site 11 was performed only for screening purposes, rather than for risk assessment purposes, to determine if a source area exists at the site. Only data resulting from low-flow (minimal stress) ground water sampling events have been included in the risk assessments per EPA request in the April 2, 1997 BCT meeting. As you know, the July 1997 samples at Site 11 were collected via Geoprobe/Hydropunch type equipment. Therefore, they were not performed by low-flow sampling methods, and were deemed inappropriate for inclusion in the risk assessment.

According to recent investigative activities and correspondence regarding the area, Site 11 appears to have been used more for equipment storage, than for fire fighting training activities. If the area was ever used for training, the use appears to have been infrequent and intermittent, leaving behind no source area. Extensive investigative activities have been conducted at Site 11, with the July 1997 results confirming that no chlorinated solvents are present in the soil or ground water.

RESPONSE TO COMMENTS FROM RIDEM REVIEW OF THE DRAFT HHRA FOR SITES 6, 8, AND 11 GROUND WATER

1. **Page 1, Section 1.0 Introduction;**
   Paragraph 2, Sentence 2.

   Risks associated with soil media for Sites 06 and 11 were previously addressed...

   Please note that soils for Site 08 have also been addressed.

   Response: The second sentence will be modified to read "risks associated with soil media for Sites 06, 08, and 11 were previously addressed ."

2. **Page 58, Section 1.6.2.1, Site 06;**
   Whole Section.

   This section deals with lead in groundwater at Site 06 and notes that one of the three wells exceeds EPA Action Level (AL) for lead in groundwater, though the average concentration of the three wells is below the AL. The analysis then concludes that risk is not anticipated from groundwater ingestion. This is not acceptable as a risk analysis. Please provide the appropriate analysis.

   Response: EA performed the quantitative and qualitative exposure analysis for lead presented below, on behalf of the Navy, to respond to the reviewer's comment.

   Risks from lead were estimated by modeling blood lead levels for future adult residents under the specified conditions of exposure. The Harley and Kneip (1985) model was used to estimate lead uptake of future resident adults. This model estimates daily blood lead levels, and is highly conservative because it assumes continuous (i.e., daily) exposure. Typically, a trend is seen during lead exposure. A peak blood-lead level will be attained and maintained if exposure is continuous but will decrease if exposure is discontinuous, or intermittent. Therefore, it is not valid to predict the daily blood lead level as the constant blood lead level that residents would have under continuous (i.e., daily) conditions of exposure if residents don't use the well water as a sole source of domestic water. Under the non-continuous exposure scenario, which will likely to be the case for future residents residing at Site 06, estimation of a weekly or yearly blood lead level is more appropriate. Therefore, using the Harley-Kneip model, daily blood lead levels are overestimated because residential exposure to well-water at Site 06 is not likely to be continuous.

   Future residents may be exposed to lead via ingestion of and dermal contact with groundwater. Dermal exposure is assumed to be negligible due to very low dermal absorption of lead (<0.1 percent), and the remainder of this analysis focuses on ingestion exposure route.

The blood lead level of 10 μg/dL has been estimated as being associated with several adverse toxic effects in humans, specifically elevated blood pressure in adult male humans, and developmental effects such as fetal toxicity following maternal exposure (ATSDR 1993). Therefore, the 10 μg/dL total blood lead level was employed as a benchmark blood level, (*i.e.*, the blood concentration above which toxic effects may be induced and below which no adverse effects are likely to occur).

The approach used to estimate whether concentrations of lead in groundwater will lead to blood level estimates exceeding the 10 μg/dL benchmark was to model blood lead levels in future residents, using the specific exposure parameters and assumptions developed for this HHRA. Naturally-occurring blood lead levels that constitute **normal** background blood lead levels for adults were added to the site-related blood estimates to yield total blood lead level estimates. The total blood lead level estimates, *i.e.*, corresponding to both site-specific blood lead levels plus background blood lead levels, were then compared to the blood lead benchmark concentration of 10 μg/dL. If the additive estimate of total blood lead exceeded 10 μg/dL, the groundwater concentration that yielded the excess blood lead level was considered to exceed a level of concern.

The estimation of average background concentrations of blood lead for adults can be made using the following equation (Harley and Kneip 1985):

$$Blood\ Lead\ (ug/dL) = \sum (\ C \times I \times A \times CF\ )$$

Where:

Parameter	Definition		Value
Blood Lead (μg/dL)	Background blood lead concentration		Estimated
C	Lead Source Concentration		
		Outdoor air	= 0.1 $\mu g/m^3$
		Indoor air	= 0.03 $\mu g/m^3$
		Soil	= 200 μg/g
		Indoor dust	= 200 μg/g
		Diet	= 15.7 μg/day
I	Source Intake		
		Outdoor air	= 1.67 m^3/day
		Indoor air	= 18.3 m^3/day
		Soil	= 0.002 g/day
		Indoor dust	= 0.018 g/day
		Diet	= 15.7 μg/day
A	Percent Absorbed		
		Inhalation	

	Ingestion	10
CF	Conversion Factor: Lead uptake (μg/day) to Blood lead level (μg/dL)	0.27

Estimation of total blood lead concentration is based on the relative amounts of lead contributed by five sources (outdoor air, indoor air, soil, indoor dust, and the diet). The concentrations of lead associated with each source medium are standard U.S. EPA estimates (*e.g.*, 0.1 μg lead/m^3 for outdoor air; 200 μg lead/g for soil) (U.S. EPA 1990a, 1994a), and are multiplied by the daily intake of the source (*e.g.*, 1.67 m^3/day of outdoor air; 0.002 g soil/day) to yield source-specific daily lead intakes (μg lead/day). Each daily lead intake is adjusted by the percent of lead actually absorbed (*i.e.*, 42 percent for inhaled lead and 10 percent for ingested lead) to yield an estimate of source-specific daily uptake of lead (μg/day). The corresponding blood lead level is then calculated using the estimated relationship between lead uptake (μg/day) and blood lead level (μg/dL) (uptake×0.27 = blood lead level) (Harley and Kneip 1985).

Using this approach, a combined daily lead uptake estimate of 2.27 μg/day was generated. This included an estimate of 0.61 μg/dL for the background blood lead level for an adult. This background blood lead level was considered to be the baseline level, to which any incremental blood lead levels due to additional lead exposure (*i.e.*, site-related) must be added.

The estimation of incremental blood lead levels for adults due to ingestion of groundwater at Site 06 can be made using the following equation (Harley and Kneip 1985).

$$\text{Blood lead level (Site-related) } (\mu g/dL) = C_w \times IR \times ABS_{GI} \times CF_{intake:blood}$$

The assumptions used to estimate site-related blood lead level are listed in the table shown below. It was conservatively assumed that future adult residents would be continuously exposed to the maximum detected lead concentration of 17.8 μg/l in groundwater. It was also conservatively assumed that the daily fluid intake rate of residents would be 2 liters. This is upper-bound daily intake rate, it is most likely that residents would consume other types of fluids (e.g., beverages), in addition to tapwater.

Assumptions for Estimating the Lead Intakes and Blood Lead Levels from Ingestion of Groundwater for Future Adult Residents

Abbreviation	Parameter	Value	Reference
C_w	Concentration in ground water (µg/L)	site specific; 17.8	Table 1-23 of Draft HHRA
IR	Ingestion rate (L/day)	2	USEPA 1991
ABS^{GI}	Gastrointestinal Absorption Fraction (unitless)	0.1	Harley and Kneip 1985

$CF_{intake:blood}$	Factor for Converting Lead Uptake (μg/day) to Blood Lead Concentration (μg/dL)[3]	0.27	Harley and Kneip 1985

Using reasonable maximum exposures, the estimate of incremental blood lead level for future resident adults based on ingestion of ground water is 0.96 μg/dL. The estimate of total (i.e., background + incremental) blood lead level is 1.57 μg/dL, which is well below the recommended threshold for potential health effects, *i.e.*, 10 μg/dL. Thus, continuous exposure of future adult residents to maximum detected lead concentration in groundwater does not constitute a level of concern.

In addition to the quantitative analysis presented above, the following qualitative considerations should be taken into account in assessing lead risks to future residents at Site 06 due to ingestion of groundwater:

a) Three wells out of six wells sampled contained detectable levels of lead in Site 06 groundwater. The reported lead concentrations were as follows: 6.4 μg/L (MW2S), 17.8 μg/L (MW3S), and 2.7 μg/L (MW4S). The comparison of these measurements against the EPA recommended Action Level (AL) of 15 μg/showed that only one well, MW3S, has lead concentrations slightly above the AL (16 percent above). The reported lead concentrations in well MW2S is below the proposed background level of 4.8 μg/L (25 percent below). The maximum detected value of 17.8 μg/L for lead is not likely to be representative of exposure point concentration of lead in Site 06 groundwater given the fact that the other two detect values are significantly lower than the EPA's AL of 15 μg/L and all other data are nondetects.

b) In addition, EPA's AL was derived using highly conservative residential exposure scenario, assuming ingestion rate of 2 liter/day, exposure frequency of 50 weeks/year, 7 days/week (i.e., 350 days/year), and exposure duration of 70 year (i.e., lifetime exposure). Because future residents are not likely to consume the Site 06 groundwater as the sole source of their drinking water (even if the site was to be developed for residential use in the future) and their exposure duration is likely to be less than 70 years (residential exposure usually assumes exposure duration of 30 years) the conservative exposure scenario used in deriving the EPA's AL may not be applicable for future residents residing at Site 06.

Based on the quantitative and qualitative analyses provided above, it is highly unlikely that future resident exposure to lead due to ingestion of groundwater will pose an unacceptable risk.

4. General Comment.

The risk analysis shows that Sites 11 and 13 pose risk for the Future Adult and Children scenarios. Please state if the Navy will propose restrictions preventing the residential use of these properties.

Response: The response is prepared only for Site 11 at this point. Antimony is the only COPC in Site 11 groundwater, which is associated with potential adverse health effects (i.e., non-cancer; Hazard Index (HI>1)) for future residents. All of the cancer risks for all receptors at Site 11 are within the USEPA recommended acceptable range (USEPA 1989a).

The majority (99%) of the estimated HI is associated with residential exposure to antimony in groundwater. As presented in the HHRA, antimony was detected in only one of thirteen samples at Site. The method detection limit for antimony was 35 ppb for ground water samples. Thus, the laboratory reported all non-detect samples (i.e., 12 samples for Site 11) at 35 ppb, which itself is associated with a hazard quotient value of 2 for ingestion of groundwater pathway for adult residents, and 7 for child residents under the reasonable maximum exposure scenario. As a result, antimony is determined to be a risk driver due to a common problem of laboratory method's inability to detect a chemical below the risk-based screening criteria (i.e., 15 ppb for antimony). In addition, risks due to antimony was estimated based on one single detect value, which is also a high source of uncertainty in the human health risk assessment. Additionally, EA used the maximum detected concentration in ground water as the exposure point concentration in exposure and risk calculations per USEPA Region I guidance. Maximum detected concentration (which is the only detect) for Site 11 was 22 percent higher than the nondetect value at Site. 11. Given the conservativeness of the exposure assumptions, and the risk characterization, resulting risk estimates for antimony is in the same order of magnitude as the risks associated with nondetect samples. In conclusion, due to the high detection limit, and the single detection at Site 11, it is likely that the estimated risk for antimony may be artificially elevated and may not represent actual risk due to the presence of antimony in groundwater at Site 11.

Based on the qualitative analyses presented above, Site 11 is not planned to be restricted for residential development.

References:

ATSDR (Agency for Toxic Substances and Disease Registry). 1993. *Toxicological Profile for Lead.* U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Atlanta, Georgia. PB93-182475. [339 pp.]

Harley, N.H. and T.H. Kneip. 1985. An Integrated Metabolic Model for Lead in humans of All Ages. *Final Report to the USEPA (Contract No. B44899) with New York University School of Medicine, Department of Environmental Medicine.*

USEPA (U.S. Environmental Protection Agency). 1989a. *Risk Assessment Guidance for Superfund: Volume I – Human Health Evaluation Manual (Part A).* Report No. EPA/540/1-89/002. USEPA, Office of Emergency and Remedial Response, Washington, D.C.

USEPA (U.S. Environmental Protection Agency). 1990a. *Research and Development, A User's Guide for Lead: A PC Software Application of the Uptake/Biokinetic Model, Version 0.40.* Environmental Criteria and Assessment Office, Office of

Health and Environmental Protection, USEPA. Cincinnati, OH. 45268. September, 1990. First Draft.

USEPA (U.S. Environmental Protection Agency). 1991. *Risk Assessment Guidance for Superfund: Volume I – Human Health Evaluation Manual: Supplemental Guidance – "Standard Default Exposure Factors" (Interim Final)*. OSWER Directive No. 9285.6-03. USEPA, Office of Emergency and Remedial Response, Washington, D.C. March 25.

USEPA (U.S. Environmental Protection Agency). 1994a. *Risk Updates*, number 2. USEPA, Region I, Waste Management Division, Boston, Massachusetts. August.

RESPONSE TO COMMENTS FROM EPA REVIEW OF THE DRAFT HHRA FOR SITES 6, 8, 11 GROUND WATER

General Comments

A. In the conclusions to this risk assessment, the Navy should provide a qualitative assessment and discussion of the nature and extent of contamination at Site 8, the range of detects and comparison to screening criteria. Although there were no COCs carried through the quantitative risk assessment, arsenic, beryllium and manganese concentrations exceeded the risk-based concentrations. Based on the comparison to the RBCs, qualitatively evaluate the potential for human health exposures and risks (e.g., would the hazard quotients add up to more than 1.0).

Response: The Navy agrees with the reviewer's comment that maximum detected concentrations of arsenic, beryllium, and manganese at Site 08 exceeds the risk-based criteria. However, when background data is available it is prudent that a statistical comparison between site concentrations and background concentrations be performed to identify the non-site related chemicals that are found at or near the site (RAGS 1989, pg 5-18, Section 5.7, first paragraph). This exercise is part of data evaluation in a human health risk assessment. EA consulted with the EPA on behalf of the Navy and received written approval of the statistical procedure described on pg 14 for comparison of site samples with background (e-mail from Jayne Michaud of USEPA Region I dated April 17, 1997). The statistical evaluation showed that none of these three chemicals are associated with potential onsite contamination, thus excluded from further analyses as chemicals of potential concern at Site 8 ground water. The analysis presented in the draft HHRA and the rationale presented here eliminates the need to perform a quantitative evaluation of exposures and risks to potential human receptors at Site 8.

B. The ground water ingestion pathway should be included in the commercial/industrial worker scenario to be consistent with the residential risk assessments. Risk managers need to understand all of the potential risks for the planned commercial/industrial workers at this site.

Response: The commercial/industrial worker incidentally ingesting ground water will be evaluated as a receptor of concern for Sites 6 and 11.

Lead is the only COPC at Site 06. Risks associated with lead in ground water could not be evaluated quantitatively because appropriate toxicity values are not available. Therefore, a qualitative evaluation of lead exposures and risks to future commercial/industrial workers will be performed in Section 1.6.2.1. The qualitative evaluation will state that "Three wells out of six wells sampled contained detectable levels of lead in Site 06 ground water. The reported lead concentrations were as follows: 6.4μg/L (MW2S), 17.8 μg/L (MW3S), and 2.7 μg/L (MW4S). The comparison of these measurements against the EPA recommended Action Level (AL) of 15 μg/showed that only one well, MW3S, has lead concentrations slightly above the AL (16 percent above). The reported lead concentrations in well MW 2S is below the proposed background level of 4.8 μg/L (25 percent below). The maximum detected value of 17.8 μg/L for lead is not likely to be representative of exposure point concentration of lead in Site 06 ground water given the fact that the other two detect values are significantly lower than the EPA's AL of 15 μg/L and all other data are nondetects. In addition, EPA's AL was derived using highly conservative residential exposure scenario, assuming ingestion rate of 2 liter/day, exposure frequency of 50 weeks/year, 7 days/week (i.e., 350 days/year), and exposure duration of 70 year (i.e., lifetime exposure). Because commercial/industrial workers are not going consume the Site 06 ground water as the sole source of their drinking water intake and may incidentally ingest ground water the intake rate of 2 liters/day is not applicable for industrial/commercial workers. The appropriate RME exposure parameters for this receptor group is as follows: ingestion rate of 0.05 liter/day, exposure frequency of 250 days/year, and exposure duration of 25 years. Because all of these exposure parameters are significantly less than the values used in deriving the AL of 15 μg/L and the maximum detected concentration of lead in Site 06 ground water is only slightly above the AL and is likely to be not representative of exposure point concentration it is highly unlikely that exposures and risks to commercial/industrial workers due to incidental ingestion of lead in ground water will pose an unacceptable risk."

Antimony and bis(2-ethylhexyl)phthalate (BEHP) are the COPCs in Site 11 ground water (see response to comment 13-h and 14 for more detail). The cancer and noncancer risk estimates are performed to quantify risks to commercial/industrial workers incidentally ingesting Site 11 ground water assuming following RME exposure scenarios: ingestion rate of 0.05 l/day, exposure frequency of 250 days/year, and exposure duration of 25 years. The revised Table 1-21, which presents the toxicity values used for antimony and BEHP, is enclosed for EPA's review. The estimated RME noncancer and cancer risks are 0.06 (HQ < 1) and 3×10^{-8} (Risk < 1×10^{-6}), respectively. These risks are within acceptable ranges per EPA guidelines (RAGS 1989). This change will result in revisions to the following sections: 1.5.1 (pg 46), 1.5.2.4 (pg 48), 1.5.2.5 (pg 50), 1.6.2.1 (pg 58), 1.6.2.2 (pg 59), 1.8 (pgs 72-77), and Tables 1-33, 1-37, 1-48, 1-49, 1-54.

Specific Comments Relevant to Sites 6, 8, and 11

1. **page 53.**First line. The Section number should read "**Section 1.5.2.6.2**".

Response: The section number in the sentence will be changed.

2. **page 53. First para. Correct both citations to read "Jo et al."**

Response: The references will be edited as suggested.

3. **Section 1.5.2.6.1.** last para. RAGS (1989) is referenced as the basis for using the 95th UCL for construction worker exposure. It is not clear in RAGS that the 95th UCL average concentration is more appropriate for non-domestic sources. Regional guidance should be followed, which calls for the maximum concentration when calculating RME risks.

Response: The Navy agrees with the reviewer's comment. However, it should be clarified that RAGS was not referenced for the purpose of indicating the basis for why the 95 UCLM was used for the non-domestic ground water source. It was referenced solely to indicate that the 95 UCLM was calculated in accordance with RAGS (1989) and USEPA (1992).

The basis for why the 95 UCLM was used for the construction worker scenario, and not the maximum concentration (as potentially proposed by regional guidance), was described within the text (see Section 1.5.2.6.1 on pg 52, second paragraph). The USEPA Region I guidance provides the rationale for use of the maximum concentration based on a scenario which assumes that ground water is being ingested as a drinking water source, and that a well placed in any single location on the site could encounter the maximum concentration. Since ingestion of ground water as a drinking water source is not a likely exposure scenario for the construction worker who is digging a basement and may encounter and incidentally ingest ground water across the site in the excavated basement trench, the rationale as presented in the regional guidance did not apply. Therefore, following the standard USEPA guidance, the 95 percent upper confidence limit on the mean was deemed to be the appropriate variable to use as the exposure point concentration for assessing potential incidental ground water ingestion exposures and risks to future construction workers.

5. **Section 1.6.2 Risk Characterization**. The general discussions on risks could be meaningful if the chemicals contributing to the risks are given. When reporting risk ranges, include the chemical associated with both ends of the range. State which chemical(s) contribute to any risk or hazard index presented.

Response: In the risk characterization section (section 1.6.2 pgs 58-65), COPCs (i.e., antimony and BEHP) associated with both ends of the range of risks will be identified. COPCs contributing to the cancer risk or hazard index for noncarcinogens will also be noted, per reviewer's comment.

6. **Section 1-8 Summary and Conclusions**. See general comment.

Response: Please refer to responses provided to General Comments A and B on previous page.

7. **Table 1-4** The units are not shown (μg/l).

Response: Tables 1-3 through 1-5 (in the Tables section of the document) will be reviewed to assure that all of the appropriate units are incorporated into the tables, including μg/l unit in Table 1-4.

13. **Table 1-21** Specific comments below. As a general note, the footnotes in Table 1-21 are not in numerical order and should be corrected in the final report.

Response: As part of the table edits, all footnotes are now in correct numerical order (see enclosed revised Table 1-21).

Individual Comments:

a) Comment: Title. Replace "quantitative toxic potency concentrations" with "toxicity." Toxicity Value is the correct term for slope factors and reference doses.

Response: The Title of Table 1-21 is modified as per reviewer's comment (See enclosed Table 1-21).

b) Comment: Values taken from IRIS or HEAST should be referenced accordingly; footnote 7 is incomplete without reference(s) or more supporting information.

Response: Sources for all toxicity values and all of the footnotes are referenced throughout Table 1-21 (See enclosed Table 1-21).

g) Comment: Bis (2-ethylhexyl) phthalate. The RfD is based on a one year assay; therefore, the footnote 6 method is incorrect and the RfD should be applied to subchronic exposures.

Response: Bis (2-ethylhexyl) phthalate (BEHP) is a COPC at Site 11 ground water. The RfD for BEHP has a total Uncertainty Factor (UF) of 1000, 10 each for inter- and intra-species variation, and 10 for "less-than-lifetime" exposure. The text in Section 1.4.1 on pg 39 was incorrect in discussion of individual UFs, and will be corrected. Subchronic RfD should still be the Chronic RfD x 10. EA consulted with EPA on this specific question on behalf of the Navy and received a written response from Jayne Michaud of EPA Region I on August 19, 1997. The EPA withdrew the original comment, but requested that the risk assessment should note that the toxicological study was longer than subchronic (but since it was less than lifetime the UF of 10 was applied to derive the RfD) and this assumption may underestimate risk slightly for subchronic ground water exposure of future construction workers at Site 11. EPA's request will be incorporated in Section 1.6.2 (Risk Characterization), Section 1.7 (Uncertainties and Limitations in Estimating Health Risks), and Section 1.8 (Summary and Conclusions).

In conclusion, no numerical change will be made to the toxicity value of bis (2-ethylhexyl) phthalate, and no risk estimates for Site 11 will be altered.

h) Comment: 1,2-Dichloroethylene. The RfD value of 2e-02 mg/kg-day should be cited as an IRIS value. The subchronic RfD in HEAST is 2e-01 mg/kg-day; please reference HEAST.

Response: The original source of 1,2-dichloroethylene at Site 11 ground water was the Environmental Baseline Survey (EBS) 88 data. The EBS88 data were included in the draft HHRA due to a misunderstanding and were, therefore, removed from consideration in this HHRA, as discussed in the October 30, 1997 BCT meeting. In addition, the sample location for the EBS88 data is side-gradient (rather than downgradient) to Site 11. Revised Table 1-5 which outlines the COPC selection process for Site 11 ground water and revised Table 1-8 which presents a list of COPCs in Site 11 ground water are enclosed for EPA's review. The reanalysis of the data in the absence of EBS data resulted in antimony and BEHP as the only COPCs in Site 11 ground water. Because the data for 1,2-Dichloroethylene and vinyl chloride are all nondetects

(13/13) these chemicals are no longer listed in Tables 1-5 and 1-8. In conclusion, EPA's comment on 1,2-Dichloroethylene is no longer applicable for Site 11.

This change in Site 11 COPCs (affecting both 1,2-Dichloroethylene and vinyl chloride) will result in revisions in the following sections: 1.3.1.2 (pg 11), 1.3.1.3.2 (pg 15), 1.3.2 (pgs 28 and 33), 1.4.1 (pgs 41 and 44), 1.6.2 (pgs 59-61), and 1.8 (pgs 73-76). The overall cancer and noncancer risks for Site 11 will decrease because 1,2-dichloroethylene and vinyl chloride are no longer COPCs in Site 11 ground water. It should be noted that all of the original dermal risk estimates in the draft HHRA are within USEPA recommended acceptable range.

14. **Comment 14. Table 1-21 and in all risk calculations for child.** Cancer slope factor for vinyl chloride should be doubled when assessing children's risk.

Response: The original source of vinyl chloride at Site 11 ground water was the Environmental Baseline Survey (EBS) 88 data. Please refer to the response to the comment 13-h given above.

15. **Comment 15. Delete Dermal Toxicity Values, Table 1-21 Delete Footnotes 2, 5, 8, 9, 13, 14, 15.**

The following comments are based on EPA's draft interim guidance on dermal risk assessment, which will supplement EPA's 1992 Dermal Exposure Assessment guidance. This guidance is under EPA review and is not available for distribution, but is appropriate for on-going risk assessments.) Correct Table 1-21 and all text and tables.

Response: It should be noted that the Navy did not have access to the EPA's draft interim guidance on dermal risk assessment during the production of this draft HHRA. EPA's new guidance on dermal risk assessment is currently not available for public review or distribution. However, Dr. Serap Erdal of EA will be receiving the new guidance from Dr. Marcia Bailey of Region 10 this week due to her role as a senior technical reviewer for the Washington Department of Ecology's new model Toxics Cleanup Act rules and guidance documents. Although we provided responses to the comments given below EA on behalf of the Navy would like to have the discretion to respond to the comments given below after the review of the aforementioned document, if warranted, before the finalization of this HHRA.

a) Comment: Table 1-21: Delete the "dermal" columns and just provide one footnote to the oral toxicity columns that adjusted oral values are typically used to assess dermal exposures (cite appropriate text for details).

Response: Dermal columns in Table 1-21 are deleted, a footnote is added to oral toxicity value column title which indicate that adjusted oral values are used to assess dermal exposures and risks. Revised Table 1-21 is enclosed for EPA's review. Details about this revision will be provided in Section 1.4.1 (pg 35) and 1.4.2 (pg 37).

b) Comment: The EPA Region 4 dermal guidance should be deleted from this report since it will be superseded by national guidance.

Response: Any reference to EPA Region 4 dermal guidance (i.e., EPA 1995f) in Table 1-21 itself as well as within the text in Section 1.4 will be deleted.

c) Comment: EPA interim draft guidance provides guidance on adjusting chemical toxicity values. For the chemicals in this risk assessment, **oral absorption** is close to **100%,** therefore adjustments to the toxicity values are not necessary. (Specifically, the draft interim guidance shows that arsenic, PAHs, PCBs, and some pesticides do not require adjustment because the gastrointestinal (GI) absorption of the compounds in their respective toxicity studies was not significantly below 100%. Cadmium, however, was identified as requiring adjustment using a factor of approximately 5%). It should be noted that assuming the default value of 100% may underestimate dermal risks. Please include in an uncertainty section of the report.

Response: The COPCs in Site 11 ground water are antimony and BEHP. (For more information on antimony please refer to RIDEM Response 4.) EA on behalf of the Navy will review the EPA's new draft dermal risk guideline and determine whether 100 percent absorption is applicable for these chemicals. The Navy would like to have the discretion to communicate with EPA about this issue, if warranted, before this HHRA is finalized. In the meantime, assuming that oral absorption for these chemicals is 100 percent and the Navy agrees with the reviewer's comment, text in Section 1.4.1 (pg 35) and 1.4.2 (pg 37) and Table 1-21 will be modified to reflect the assumption of 100 percent oral absorption for COPCs and no need to adjust oral toxicity values for dermal risk estimates. This change will result in revisions to quantitative dermal risk estimates presented in Section 1.6.2.2 (pg 60-61) for Site 11 for future residents (i.e., adults and children). It will also be noted in section 1.7.3 (pg 67) that assumption of 100 percent oral absorption may underestimate dermal risks.

In conclusion, this change will result in a decrease in cancer and noncancer risk estimates associated with residential exposure to antimony and BEHP because the dermal toxicity values will be higher resulting in lower hazard quotient (or index) values. It should be noted that all of the original dermal risk estimates in the draft HHRA are within USEPA recommended acceptable ranges.

17. **Tables 1-23 through 1-25, and relevant intake and risk summary tables.** The maximum concentrations to calculate the RME risks for ground water, rather than the 95th upper confidence limits on average concentrations (UCLs).

Response: Please refer to response to comment #3.

TABLE 1-5 Selection of Chemicals of Concern from List of Detected Analytes in Groundwater-- Site 11, Davisville

Chemical (1)	Max Detected Concentration (ug/L) (2,*)	Risk-Based Concentration (ug/L) (3)	RIDEM Method 1 (ug/L)	Max > RBC?	Frequency of Detection	Frequency of Detection (4)	Frequency of Detection > 5%?	Statistically Elevated Above Background? (5)	Essential Nutrient? (6)	COC? (7)
Inorganics (ug/L)										
Aluminum	4760	3700		Yes	10/13	76.92%	Yes	No	No	No
Antimony	44.8	1.5	6	Yes	1/13	7.69%	Yes	Yes	No	Yes
Arsenic	6.2	0.045		Yes	2/13	15.38%	Yes	No	No	No
Barium	71.7	260	2000	No	13/13	100.00%	Yes	No	No	No
Cadmium	0.44	1.8	5	No	1/13	7.69%	Yes	No	No	No
Calcium	29300			-	13/13	100.00%	Yes	Yes	Yes	No
Chromium	9.9	18	100	No	2/13	15.38%	Yes	No	No	No
Cobalt	13.6	220		No	1/13	7.69%	Yes	No	No	No
Copper	11.5	150		No	4/13	30.77%	Yes	No	No	No
Iron	55800	1100		Yes	13/13	100.00%	Yes	Yes	Yes	No
Lead	2.2	15	15	No	1/13	7.69%	Yes	No	No	No
Magnesium	8240			-	13/13	100.00%	Yes	No	Yes	No
Manganese	2710	84		Yes	13/13	100.00%	Yes	No	No	No

Chemical [1]	Max Detected Concentration (ug/L) [2,*]	Risk-Based Concentration (ug/L) [3]	RIDEM Method 1 (ug/L)	Max > RBC?	Frequency of Detection	Frequency of Detection [4]	Frequency of Detection > 5%?	Statistically Elevated Above Background? [5]	Essential Nutrient? [6]	COC? [7]
Potassium	9320			-	8/13	61.54%	Yes	Yes	Yes	No
Silver	1	18		No	10/13	76.92%	Yes	No	No	No
Sodium	33100			-	13/13	100.00%	Yes	No	Yes	No
Vanadium	7.6	26		No	1/13	7.69%	Yes	No	No	No
Volatiles (ug/L)										
1,1,1-Trichloroethane	2	79	200	No	2/13	9.52%	Yes	NA	NA	No
Acetone	16	370		No	1/13	4.76%	No	NA	NA	No
Semivolatiles (ug/L)										
Bis(2-ethylhexyl) phthalate	14	4.8		Yes	1/12	8.33%	Yes	NA	NA	Yes
Diethyl phthalate	2	2900	6	No	2/13	15.38%	Yes	NA	NA	No
Phenol	1	2200		No	1/13	7.69%	Yes	NA	NA	No
Pesticides/PCB (ug/L)										
Aldrin	0.0015	0.004		No	1/13	7.69%	Yes	NA	NA	No
Alpha-HCH	0.0011	0.011		No	1/13	7.69%	Yes	NA	NA	No

Chemical (1)	Max Detected Concentration (ug/L) (2,*)	Risk-Based Concentration (ug/L) (3)	RIDEM Method 1 (ug/L)	Max > RBC?	Frequency of Detection	Frequency of Detection (4)	Frequency of Detection > 5%?	Statistically Elevated Above Background? (5)	Essential Nutrient? (6)	COC? (7)
Gamma-HCH (Lindane)	0.0017	0.052		No	1/13	7.69%	Yes	NA	NA	No

Notes:
1- Table presents only those constituents identified above laboratory detection limits
2- Maximum detected concentration of low-flow samples collected by TRC in 1993
3- RBC screening was conducted by comparing maximum detected concentration of a chemical to its USEPA Region III RBC. If the max. concentration of a carcinogen exceeded its RBC in tap water, or if the max. concentration of a noncarcinogen exceeded one-tenth its RBC in tapwater, the chemical was included for further consideration.
4- The chemicals with frequency of detection (ie, detection above laboratory detection limit) greater than or equal to 5 % were retained for further consideration.
5- A statistical analysis was performed to determine whether the difference between site concentrations and the background concentrations proposed by Stone & Webster (1996) were statistically significant or not. The statistical method used was the method of evaluation of exceedance, based on the number of exceedances above the background levels, per discussion with EPA Region I. The chemicals with concentrations statistically elevated above the background levels were retained for further consideration.
6- A chemical was eliminated from the list of COC if it was an essential nutrient of low toxicity.
7-Constituent of Concern
NA- Not Applicable
*Maximum concentration of each chemical was also compared to RIDEM Method I Groundwater Quality Standard (mg/l), if available. The RBC concentrations were more stringent than the Method I values in all cases.

Sources:
Background Value - Final Basewide Ground Water Inorganics Study Report, Stone & Webster, 06 September 1996, as revised 15 November 1996
EPA Region III RBC - Risk-Based Concentration Table, January-June 1996, US EPA Region III, April 1996
Draft Final Phase II Remedial Investigation, TRC 1994
Draft Environmental Baseline Survey - EA Engineering 1996
Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part A). EPA/540/1-89/002. December 1989.
RIDEM. Remediation Regulations. DEM-DSR-01-93.Table 3-Groundwater Objectives. pg. 48. August. 1996.
Personal Communication with Jayne Michaud, USEPA Region I. April 15. 1997.

TABLE 1-8. Summary of Chemicals of Concern for Site 11, NCBC Davisville

Chemical of Concern	Ground Water
Antimony	✓
Bis(2-ethylhexyl)phthalate	✓

TABLE 1-21 TOXICITY VALUES FOR CONSTITUENTS OF CONCERN AT DAVISVILLE, SITES 06 and 11

Chemical	Cancer Slope Factors (SFs) $(mg/kg\text{-}day)^{-1}$		Reference Doses (RfDs) (mg/kg-day)			
			Subchronic		Chronic	
	Ingestion(1)	Inhalation	Ingestion(1)	Inhalation	Ingestion(1)	Inhalation
INORGANIC COMPOUNDS						
Antimony	NA		4×10^{-4} (2)	4×10^{-4} (3)	4×10^{-4} (4)	4×10^{-4} (3)
Lead	NA		NA		NA	
SEMIVOLATILES/PAHS						
Bis(2-ethylhexyl)phthalate	1.4×10^{-2} (4)	NA	2×10^{-1} (5)	2×10^{-1} (3)	2×10^{-2} (4) (6)	2×10^{-2} (3)

NA Toxicity value not available.
(1) Adjusted oral toxicity values are typically used for dermal toxicity values. See Section 1.4.1 (under Dose-Response Assessment) for more detail.
(2) Chronic oral RfD value, based on chronic study, was used for the subchronic oral RfD value without modification, as per USEPA (1989a) *Risk Assessment Guidance for Superfund.*
(3) Oral RfD value used for inhalation RfD value without modification.
(4) Value obtained from IRIS 1997.
(5) Subchronic oral RfD value derived by multiplying chronic RfD value by 10, as per USEPA (1989a) *Risk Assessment Guidance for Superfund.*
(6) Chronic oral RfD value based on subchronic study.